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BRIEF REPORT

Earthquake Impact in a Remote South Asian Population: Psychosocial Factors and Posttraumatic Symptoms

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Although previous studies have documented the psychological impact of earthquakes, less is known about potentially protective characteristics associated with healthier outcomes. In the present study, 2 samples of survivors were recruited from remote villages in Northwestern Pakistan, 7 and 19 months after the devastating October 2005 earthquake. Female gender, lower education, and closer proximity to the epicenter predicted significantly higher posttraumatic symptom levels. After adjusting for demographic characteristics, distance from the epicenter, and death of close relatives, higher dispositional optimism and higher scores on the Connor-Davidson Resilience Scale were significantly associated with lower symptom levels. The authors' findings in a previously unstudied population suggest that certain potentially protective mechanisms, such as optimism, may be universal regardless of culture of origin.

Earthquakes are one of the most devastating natural disasters. Studies have identified a range of factors associated with higher posttraumatic symptom levels, for example female gender (Chen et al., 2007), lower education, family deaths (Basoglu, Kilic, Salcioglu, & Livanou, 2004), and distance from the epicenter in some (Armenian et al., 2000) but not all studies (Basoglu et al., 2004). Less is known about potential protective characteristics associated with healthier outcomes, especially in developing countries. Most earthquake studies have been conducted in the United States, Europe, and Southeast Asia (Neria, Nandi, & Galea, 2008), and fewer have focused on South Asian populations, where modern psychiatry is virtually nonexistent.

In October 2005, a devastating earthquake struck the mountainous region of the Northwestern Frontier Province in Pakistan. More than 250,000 people perished and millions (3.5) became homeless. Soon after the earthquake, the area was completely cut off from the rest of the mainland. Postdevastation, some nonprofit organizations sent mental health volunteers to the major cities in the region. The majority of the villages and towns, however, received no mental health resources. In the present study, two survivor samples were recruited from remote villages. Based on prior studies (Kilic et al., 2006; Neria et al., 2008), we hypothesized that female gender, proximity to epicenter, and deaths of family members would be associated with higher symptom levels, whereas age and education would be inversely related to symptom levels. We chose to study dispositional optimism because it has consistently been associated with stress resistance in the face of trauma, including earthquake exposure (Alim et al., 2008; Connor & Davidson,

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2003; Pargament, Smith, Koenig, & Perez, 1998), and religious coping given the central role of religion in Pakistani culture. We also piloted the Connor-Davidson Resilience Scale (CD-RISC) as it measures a range of characteristics "that enable individuals to thrive in the face of adversity," drawn from decades of work by resilience theorists and researchers (Connor & Davidson, 2003). We predicted that optimism, positive religious coping, and higher CD-RISC scores would be associated with lower symptom levels, and negative religious coping with higher symptom levels (Alim et al., 2008; Pargament et al., 1998).

METHOD

Participants

This cross-sectional study was conducted in two separate waves, the first one in May 2006, 7 months after the earthquake, and the second one in May 2007, 1 year later. During each wave, the first author, S.A. traveled to Pakistan and recruited a sample of convenience of survivors from remote villages within 80 miles of the epicenter. Individuals were approached in the community, including in their homes, community centers, local colleges, schools, and relief camps. Second-wave participants were recruited primarily from local colleges near the epicenter. Participants provided verbal (videotaped) or written informed consent.

Measures

Participants were read all questions by S.A., inquiring about demographics, distance from the epicenter, damage to home and family deaths, as well as four self-report scales. All scales were translated into Urdu in advance and reviewed by a consensus team. The Traumatic Stress Symptom Checklist is a self-report scale validated in non-Western populations, containing 17 items assessing posttraumatic stress disorder (PTSD) symptoms and 6 assessing depressive symptoms (Basoglu et al., 2001). The 6-item Life Orientation Test-Revised measures dispositional optimism (Scheier, Carver, & Bridges, 1994), and has been validated in a non-Western population (Lai, Cheung, Lee, & Yu, 1998). It yields optimism and pessimism scores. A 6-item version of the RCOPE was used to measure religious coping (Pargament, Koenig, & Perez, 2000), yielding positive and negative religious coping scores. The CD-RISC, validated in non-Western populations (Khoshouei, 2009), is a 25-item self-report scale measuring personal characteristics associated with psychological resilience (Connor & Davidson, 2003).

Data Analysis

All analyses were performed using SPSS 16.0, and were conducted separately for first and second wave samples. Death of family members was dichotomized into loss of (1) at least one close relative (parent, grandparent, child, grandchild, sibling, or spouse) or (0) only distant/no relatives. A series of hierarchical multivariate linear regression analyses was conducted, with mean total symptom scale score, and mean PTSD and depressive symptom subscale scores as the outcomes. For the first and second wave models, demographic characteristics were entered in Step 1, followed by distance from the epicenter and loss of close relatives in Step 2. For the second wave models, psychosocial variables (optimism, and positive and negative religious coping) were entered in Step 3 using stepwise selection. CD-RISC scores were added to Step 3 in separate analyses with the subsample of second-wave participants who completed this questionnaire. All statistical tests were two-tailed.

RESULTS

Demographic characteristics and earthquake exposure are summarized in Table 1. Symptom scale scores and psychosocial scale scores are listed in Table 2. Rates [n (%)] of probable PTSD (PTSD symptom subscale score > 25) were 33 (79.5%) for the first wave and 11 (21.5%) for the second. Female gender and proximity to the epicenter were associated with higher symptom levels in the

Table 1. Demographic Characteristics and Earthquake-Related Factors

Variables	First wave ($n = 44$)	Second wave ($n = 51$)[a]
Age (years), mean (SD)	35.3 (12.7)	31.2 (12.8)
Gender, *n* (%)		
Female	12 (27.3%)	0
Male	32 (72.7%)	51 (100.0%)
Marital status, *n* (%)		
Married	32 (72.7%)	27 (52.9%)
Single/unmarried	12 (27.3%)	22 (43.1%)
Widowed	0	2 (3.9%)
Education, *n* (%)		
Illiterate	9 (20.5%)	3 (5.9%)
Below 6th grade	5 (11.4%)	4 (7.8%)
6th to 8th grade	8 (18.2%)	7 (13.7%)
High school graduate	14 (31.8%)	18 (35.3%)
At least some college	6 (13.6%)	13 (25.5%)
College graduate	2 (4.5%)	6 (11.8%)
Distance from epicenter (miles), mean (*SD*)	49.4 (26.8)	67.4 (15.8)
Sustained home damage, *n* (%)	44 (100.0%)	50 (98.0%)
Became homeless, *n* (%)	44 (100.0%)	46 (90.2%)
Family deaths, *n* (%)		
Loss of close relatives	21 (56.7%)[b]	23 (45.1%)
Number of deaths, mean (*SD*)	1.6 (0.8)	2.0 (2.0)

[a] $n = 3$ also participated in the first wave. [b] $n = 7$ had missing data, % reflects valid percentage.

Table 2. Descriptive Statistics for TSSC and Psychosocial Scale Scores

Variables, mean (*SD*)	Possible range	First wave ($n = 44$) *M*	First wave ($n = 44$) *SD*	Second wave ($n = 51$)[a] *M*	Second wave ($n = 51$)[a] *SD*
TSSC-Total score	0–69	44.6	14.9	24.5	14.0
TSSC-PTSD subscale score	0–51	33.5	11.7	18.6	9.6
TSSC Depression subscale score	0–18	11.1	4.6	5.9	5.2
LOT-R optimism	0–12			8.9	2.7
LOT-R pessimism	0–12			6.8	2.9
Positive religious coping	0–9			8.6	0.8
Negative religious coping	0–9			3.3	2.7
CD-RISC	0–100			81.2[b]	12.3

Note. TSSC = Traumatic Stress Symptom Checklist; PTSD = posttraumatic stress disorder; LOT-R = Life Orientation Test- Revised; CD-RISC = Connor-Davidson Resilience Scale.
[a] $n = 3$ also participated in the first wave. [b] $n = 29$.

first-wave sample, whereas education was inversely related to symptom levels in both waves (see Tables 3 and 4). After adjusting for other characteristics, dispositional optimism remained significantly associated with lower Traumatic Stress Symptom Checklist-Total and Depression scores (Table 4).

In analyses with the CD-RISC conducted in a subgroup of second-wave participants (not shown in table), mean CD-RISC score replaced dispositional optimism as the only psychosocial variable significantly associated with lower total symptom scale ($\beta = -.49$, $p < .01$) and depressive symptom subscale ($\beta = -.55$, $p < .001$) scores, and was also significantly associated with a lower PTSD symptom subscale score ($\beta = -.42$, $p < .05$).

DISCUSSION

To our knowledge, this is the first study to measure posttraumatic symptoms, and potential risk and protective factors, in earthquake survivors from remote South Asian villages with little access to resources. The first-wave prevalence of probable PTSD greatly exceeded the usual prevalence of PTSD among disaster victims (Neria et al., 2008). This may relate to the universal postearthquake homelessness in this sample (Kilic et al., 2006) and the communities' isolation. Limited mental health resources are associated with poorer mental health outcomes in developing countries (Math et al., 2006). Similar to some prior studies (Basoglu et al., 2001; Galea, Nandi, & Vlahov, 2005), female gender, lower education, and higher proximity to the epicenter (the latter only in the first-wave sample) were significantly associated with higher symptom levels. In the first- but not the second-wave sample, lower education was more specifically associated with depressive symptoms, as has been reported in some studies (Kilic et al., 2006).

Dispositional optimism, previously found to be inversely related to general distress levels in earthquake survivors (Sumer, Karanci, Berument, & Gunes, 2005), was associated with lower general and specifically depressive (but not PTSD) symptom levels, suggesting a closer link between optimism and depression. Higher scores on the CD-RISC in a subsample were also associated with

Table 3. First Wave Hierarchical Regression Analyses: Demographic Characteristics, Distance from Epicenter, and Loss of Close Relatives

Model[a]	Variable	TSSC-Total ß	TSSC-Total R^2 for model	TSSC-PTSD ß	TSSC-PTSD R^2 for model	TSSC-Depression ß	TSSC-Depression R^2 for model
1	Age	.06	.35	.10	.34	−.07	.30
	Female gender	.27		.39*		−.16	
	Marital status	−.02		.00		−.07	
	Education	−.29		−.13		−.62**	
2	Age	−.07	.40	.01	.41	−.19	.36
	Female gender	.10		.25		−.30	
	Marital status	.00		.02		−.06	
	Education	−.47*		−.30		−.76***	
	Distance from epicenter	−.42*		−.39*		−.35*	
	Loss of close relatives	−.14		−.16		.04	

Note. TSSC = Traumatic Stress Symptom Checklist; PTSD = posttraumatic stress disorder.
[a] Step 1: demographic characteristics; Step 2: distance from epicenter and loss of close relatives.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 4. Second Wave Hierarchical Regression Analyses: Demographic Characteristics, Distance From Epicenter, Loss of Close Relatives, and Psychosocial Factors

		TSSC-Total[b]		TSSC-PTSD[c]		TSSC-Depression[b]	
Model[a]	Variable	ß	R^2 for model	ß	R^2 for model	ß	R^2 for model
1	Age	.11	.23	.07	.18	.15	.27
	Marital status	−.04		−.04		−.04	
	Education	−.43**		−.40**		−.44**	
2	Age	.33	.26	.04	.22	.08	.30
	Marital status	−.02		.01		−.06	
	Education	−.47**		−.45**		−.45**	
	Distance from epicenter	.07		.14		−.06	
	Loss of close relatives	.16		.15		.17	
3	Age	−.09	.34			−.08	.39
	Marital status	.14				.12	
	Education	−.41*				−.38*	
	Distance from epicenter	.10				−.04	
	Loss of close relatives	.18				.19	
	LOT-R optimism	−.33*				−.36*	
	LOT-R pessimism						
	Positive religious coping						
	Negative religious coping						

Note. TSSC = Traumatic Stress Symptom Checklist; PTSD = posttraumatic stress disorder; [c]LOT-R = Life Orientation Test–Revised.
[a]Step 1: demographic characteristics; Step 2: distance from epicenter and loss of close relatives; Step 3: psychosocial variables (stepwise method). [b]None of the excluded variables reached the trend level. [c]LOT-R optimism was excluded at the trend level: Std. ß = −.28, $p = .06$.
* $p < .05$. ** $p < .01$.

lower symptom levels. The narrow interindividual variability in positive religious coping in our sample may explain the lack of findings with this measure.

Strengths of this study include the recruitment of previously unstudied samples from South Asian communities detached from the modern world; the study of naturalistic symptom levels without mental health intervention; and the investigation of potential protective factors previously understudied in earthquake survivors. Limitations include small sample sizes, recruitment of samples of convenience, the second sample consisting of male subjects only, the cross-sectional nature of the study, the lack of assessment of potential protective factors in the first wave, and the lack of validation of some instruments in non-Western populations.

Some have argued that PTSD is primarily a Western phenomenon fueled by the media and compensation (McHugh & Treisman, 2007). However, participants had very limited access to Western media and most had never heard of PTSD. Our preliminary findings suggest that certain potentially protective mechanisms, such as optimism, may be universal regardless of culture of origin. Future longitudinal studies should clarify potential causal relationships with symptom outcomes.

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